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EXAMINER	
BOWMAN, MARY ELLEN	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)
	10/598,792	KUBOTA ET AL.
	Examiner	Art Unit
	MARY ELLEN BOWMAN	4174

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 September 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-21* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *12 September 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *05 December 2006*.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Priority

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Information Disclosure Statement

2. The information disclosure statement (IDS) submitted on 05 December 2006 was considered by the examiner.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims **1-4, 6-8, 10, 17, 18, and 20** are rejected under 35 U.S.C. 102(b) as being anticipated by Matsuda et al., USPN 6,069,439, published May 30, 2000 (hereinafter referred to as "Matsuda").

5. Regarding claim 1, Matsuda teaches an electroluminescent phosphor, comprising phosphor particles and electron-emitting particles (e.g., col 2, lines 66-67; "the phosphor material...comprises a phosphor particle, and a conductive layer [i.e., and electron emitting material layer] formed on the surface of the phosphor particle"), wherein the electron-emitting material particles are not originating from atoms constituting the host material of the phosphor and an activator, and the electron-emitting material particles are contained inside the phosphor particles or included between the phosphor particles in close contact with them (e.g., col 3, lines

53-56; “as for the material for the conductive layer to be formed on the surface of the phosphor particle...any inorganic material such as...indium tin oxide...can be employed"; Note: Indium tin oxide is not the host or activator of the suggested phosphors).

6. Regarding claim 2, Matsuda teaches the invention as explained above regarding claim 1, and further teaches the electron-emitting material has an electric resistivity of 10^7 Ω*cm or less (e.g., col 3, lines 63-65; “the electric resistance of the conductive material [i.e., the electron emitting material] may be as low as 10^4 Ω*cm or less”).

7. Regarding claim 3, Matsuda teaches the invention as explained above regarding claim 1, and further teaches the electron-emitting material particles have an aspect ratio (L/D) of 1.5 or more, the aspect ratio (L/D) being a ratio of a major axis (L) and a minor axis (D) (e.g., col 4, lines 20-23; “the phosphor material comprising a phosphor particle covered with a thin uniform conductive layer, has the ratio between the minor axis and the major axis of 1.5 or less [i.e., including 1.5]”).

8. Regarding claim 4, Matsuda teaches the invention as explained above regarding claim 1, and further teaches the electron-emitting material particles have a particle diameter which does not exceed the particle diameter of the phosphor particles (e.g., col 4, lines 8-10; “the thickness of the conductive layer to be formed on the surface of the phosphor particle should preferably be 10% or less of the particle size of the phosphor particle").

9. Regarding claim 10, Matsuda teaches the invention as explained above regarding claim 1, and further teaches an electroluminescent element, comprising a light emitting layer containing the phosphor as explained above regarding claim 1 (e.g., col 1, lines 6-9; “a phosphor

material…and also to a display device such as a vacuum fluorescent display and a field emission display").

10. Regarding claim 6, Matsuda teaches a method of manufacturing an electroluminescent phosphor, comprising: mixing a phosphor material including elements constituting the host material of a phosphor and an activator or a compound containing the elements and electron-emitting material particles (e.g., col 5, lines 7-9 and 23-25; "supplying the conductive material [i.e., electron emitting material] and phosphor particles into the plasma…the evaporated conductive material is caused to adhere onto the surfaces of the spherical phosphor particles"); and baking the prepared mixture by heating to yield an electroluminescent phosphor comprising phosphor particles and the electron-emitting material particles contained in the phosphor particles (e.g., col 5, lines 19-25; "at least the surfaces of the phosphor particles are caused to melt by the heat from the plasma, and...conductive material is caused to adhere onto the surfaces of the spherical phosphor particles").

11. Regarding claim 7, Matsuda teaches a method of manufacturing an electroluminescent phosphor, comprising: mixing a phosphor material including elements constituting the host material of a phosphor and an activator or a compound containing the elements and electron-emitting material particles (e.g., col 5, lines 7-9 and 23-25; "supplying the conductive material [i.e., electron emitting material] and phosphor particles into the plasma…the evaporated conductive material is caused to adhere onto the surfaces of the spherical phosphor particles"), and heating for baking the mixture to prepare phosphor particles (e.g., col 5, lines 19-23; "at least the surfaces of the phosphor particles are caused to melt by the heat from the plasma, and…the phosphor particles are made into spherical shape [i.e., prepared]"); mixing the phosphor particles

prepared in the previous step with electron-emitting material particles (e.g., col 5, lines 7-9 and 23-25; "supplying the conductive material [i.e., electron emitting material] and phosphor particles into the plasma…the evaporated conductive material is caused to adhere onto the surfaces of the spherical phosphor particles"); and baking the mixture prepared in the previous mixing step by heating to produce an electroluminescent phosphor comprising phosphor particles and the electron-emitting material particles contained in the phosphor particles (e.g., col 5, lines 19-25; "at least the surfaces of the phosphor particles are caused to melt by the heat from the plasma, and...conductive material is caused to adhere onto the surfaces of the spherical phosphor particles").

12. Regarding claim 8, Matsuda teaches the inventions as explained above regarding claim 6 or 7, and further teaches mixing and heating the electroluminescent phosphor produced in the baking step and the phosphor material to bake the mixture (e.g., col 5, lines 44-47; "it is preferable to subject the phosphor material obtained by the thermal plasma process to heat treatment at a temperature of 800 to 1600 °C").

13. Regarding claim 17, Matsuda teaches an electroluminescent element, comprising: a light emitting layer (e.g., col 7, line 32; "phosphor material"); first and second electrode layers which are disposed on both surfaces of the light emitting layer; and an apparatus for applying an electric field between the electrode layers (e.g., col 7, lines 54-56; "a voltage…was applied to the anode [i.e., first electrode] in relative to the cathode [i.e., second electrode] in each display…and…[light] emission was observed"), wherein the light emitting layer is formed of lamination of a phosphor layer of at least one layer and an electron emission source layer of at least one layer including an electron-emitting material not originating from the atoms

constituting the host material of the phosphor and an activator (e.g., col 2, lines 66-67; "the phosphor material...comprises a phosphor particle, and a conductive layer [i.e., and electron emitting material layer] formed on the surface of the phosphor particle").

14. Regarding claim 18, Matsuda teaches the invention as explained above regarding claim 17, and further teaches an insulating layer is disposed between at least6 one of the first and second electrode layers and the light emitting layer (e.g., col 6, lines 19-22; "a gate electrode 4…each disposed in conformity with each electrode 6, is formed on the insulating layer 5").

15. Regarding claim 20, Matsuda teaches the invention as explained above regarding claim 17, and further teaches the electron-emitting material is fine particles which have at least one type selected from (Indium Tin Oxide) (ITO), (Antimony Tin Oxide) (ATO) and conductive ZnO as a main component or such fine particles coated with an insulating material (e.g., col 3, lines 53-56; "the material for the conductive layer [i.e., the electron emitting material] to be formed on the surface of the phosphor particle...any inorganic material such as...indium tin oxide...zinc oxide...can be employed").

Claim Rejections - 35 USC § 103

16. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

17. Claims **5, 12, and 14-16** are rejected under 35 U.S.C. 103(a) as being unpatentable over Matsuda in view of Kitagishi et al., JP 03-024188, published February 1, 1991 (hereinafter

referred to as "Kitagishi"). Note: The English abstract of Kitagishi, provided by applicant, is used for purposes of citation in this Action.

18. Regarding claim 5, Matsuda teaches the invention as explained above regarding claim 1, but fails to teach the weight percentage of the phosphor mixture.

19. Kitagishi teaches a content ratio of the electron-emitting material particles to the phosphor particles is 0.00001 to 50 weight% (e.g., English abstract; "100 pts.wt. phosphor powder is mixed with 1-90 pts.wt., pref. 2-60 pts.wt. needlelike conductive powder").

20. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the above listed weight% of electron emitting material to phosphor, because it has been held that where the ordinary conditions of a claim are taught in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

21. Regarding claim 12, Matsuda teaches an electroluminescent element, comprising: a light emitting layer including phosphor particles and electron-emitting material particles not originating from atoms constituting the host material of the phosphor and an activator (e.g., col 2, lines 66-67; "the phosphor material...comprises a phosphor particle, and a conductive layer [i.e., and electron emitting material layer] formed on the surface of the phosphor particle").

22. Matsuda fails to teach the weight% of the conductive material.

23. Kitagishi teaches the electron emitting material comprises a conductive compound, and a content ratio of the electron-emitting material in the light emitting layer is 1 to 75 weight% (e.g.,

English abstract; "100 pts.wt. phosphor powder is mixed with 1-90 pts.wt., pref. 2-60 pts.wt. needlelike conductive powder").

24. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the above listed weight% of electron emitting material to phosphor, because it has been held that where the ordinary conditions of a claim are taught in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

25. Regarding claim 14, Matsuda and Kitagishi teach the invention as explained above regarding claim 12, and Matsuda further teaches the electron-emitting material has an electric resistivity of 10^7 Ω*cm or less (e.g., col 3, lines 63-65; "the electric resistance of the conductive material [i.e., the electron emitting material] may be as low as 10^4 Ω*cm or less").

26. Regarding claim 15, Matsuda and Kitagishi teach the invention as explained above regarding claim 12, and Matsuda further teaches the electron-emitting material particles are fine particles including ITO (Indium Tin Oxide) as a main component (e.g., col 3, lines 53-56; "as for the material for the conductive layer to be formed on the surface of the phosphor particle...any inorganic material such as...indium tin oxide...can be employed").

27. Regarding claim 16, Matsuda and Kitagishi teach the invention as explained above regarding claim 12, and Kitagishi further teaches the electron-emitting material particles are fine particles including ATO (Antimony Tin Oxide) as a main component (e.g., English abstract; "tin oxide contg. antimony are esp. pref. as the conductive powder").

28. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use antimony tin oxide as a main component of the conductive powder as opposed to indium tin oxide, because they are well known substitutions for each other and both are taught by Kitagishi as possible conductive powders.

29. Claim **11** is rejected under 35 U.S.C. 103(a) as being unpatentable over Matsuda in view of Kinlen, USP App. Pub. No. 2004/0018379 A1, published January 29, 2004 (hereinafter referred to as "Kinlen").

30. Matsuda teaches the invention as explained above regarding claim 10, but fails to teach a phosphor dispersed in a dielectric matrix.

31. Kinlen teaches a light emitting layer having the electroluminescent phosphor dispersed into a dielectric matrix (e.g., [0051]; "ink matrix formed with LEP-phosphor particles with a dielectric binder material"), a transparent electrode layer which is disposed on one main surface of the light emitting layer, and a backplate electrode layer which is disposed on the other main surface of the light emitting layer therebetween (e.g., [0038]; "illumination layer 104 [i.e., the phosphor layer] is sandwiched between a rear electrode layer 107…and a transparent electrode layer 108").

32. It would have been obvious to one of ordinary skill in the art at the time the invention was made to disperse the phosphor in a dielectric matrix in order to obtain the well known benefit of insulating the particles from the harmful effects of the environment, which would shorten the life of the display device.

33. Claim **9** is rejected under 35 U.S.C. 103(a) as being unpatentable over Matsuda in view of Funayama et al., JP 05-320637 A, published December 3, 1993 (hereinafter referred to as "Funayama"). Note: The attached English translation of Funayama is used for citation purposes in this Action.

34. Matsuda teaches a method of manufacturing an electroluminescent phosphor, comprising: mixing a phosphor material including elements constituting the host material of a phosphor and an activator or a compound containing the elements and electron-emitting material particles (e.g., col 5, lines 7-9 and 23-25; "supplying the conductive material [i.e., electron emitting material] and phosphor particles into the plasma…the evaporated conductive material is caused to adhere onto the surfaces of the spherical phosphor particles"), and heating for baking the mixture to prepare phosphor particles (e.g., col 5, lines 19-23; "at least the surfaces of the phosphor particles are caused to melt by the heat from the plasma, and…the phosphor particles are made into spherical shape [i.e., prepared]"); mixing the phosphor particles prepared in the previous step with electron-emitting material particles (e.g., col 5, lines 7-9 and 23-25; "supplying the conductive material [i.e., electron emitting material] and phosphor particles into the plasma…the evaporated conductive material is caused to adhere onto the surfaces of the spherical phosphor particles").

35. Matsuda fails to teach pressing the phosphor mixture.

36. Funayama teaches pressing the mixture prepared in the mixing step at normal temperature or while heating to closely contact the phosphor particles with the electron-emitting material particles included between phosphor particles (e.g., claim 5; "the manufacture method

of a...fluorescent substance characterized by drying after performing heating pressure treatment [i.e., pressing]").

37. It would have been obvious to one of ordinary skill in the art at the time the invention was made to employ pressure treatment in the preparation of the phosphor layer, because it provides the well known benefit of increasing the speed with which the conductive layer adheres to the phosphor particles, thereby decreasing production time.

38. Claim **13** is rejected under 35 U.S.C. 103(a) as being unpatentable over Matsuda in view Kitagishi as applied to claim 12 above, and further in view of Kinlen.

39. Matsuda and Kitagishi teach the invention as explained above regarding claim 12, but fail to teach a dielectric layer.

40. Kinlen teaches a transparent electrode layer which is disposed on one main surface of the light emitting layer and a backplate electrode layer which is disposed on the other main surface of the light emitting layer with a dielectric layer therebetween (e.g., [0053]; "a substrate 401, a rear electrode layer 402, a dielectric layer 403, an illumination layer 404, an electrically conductive layer 405").

41. It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide a dielectric layer between at least one electrode and the light emitting layer, because a dielectric layer provides the well known benefit of insulating the light emitting layer from direct contact with the electrode, thereby providing more accurate control of the display picture.

42. Claims **19 and 21** are rejected under 35 U.S.C. 103(a) as being unpatentable over Matsuda in view Okumura et al., USPN 6,100,633, published August 8, 2000 (hereinafter referred to as "Okumura").

43. Regarding claims 19 and 21, Matsuda teaches the invention as explained above regarding claim 17, and further teaches the electron-emitting material has an electric resistivity of 10^{-3} to 10^{8} Ω*cm (e.g., col 3, lines 63-65; "the electric resistance of the conductive material [i.e., the electron emitting material] may be as low as 10^{4} Ω*cm or less"), and the electron emission source layer is a thin film which ahs at least one type selected from ITO, ATO and conductive ZnO as a main component (e.g., col 3, lines 53-56; "as for the material for the conductive layer to be formed on the surface of the phosphor particle...any inorganic material such as...indium tin oxide, zinc oxide...can be employed").

44. Matsuda fails to teach a surface irregularity.

45. Okumura teaches the electron-emitting material has a surface irregularity of 40 μm or less (e.g., col 6, lines 64-66; "the irregularities on the surface of the phosphor particles to be at most 5% of the particle diameter; and col 8, line 62; "average particle size of 3 μm"; Note: Surface irregularity would therefore be less than 5% of 3 μm, which falls within the range of 40 μm or less).

46. It would have been obvious to one of ordinary skill in the art at the time the invention was made to create a phosphor layer with a surface irregularity of 40 μm or less, because a higher surface irregularity increases the likelihood of a blurred image (Okumura; col 2, lines 15-20).

Conclusion

47. Any inquiry concerning this communication or earlier communications from the examiner should be directed to MARY ELLEN BOWMAN whose telephone number is (571)270-5383. The examiner can normally be reached on Monday-Thursday, 6:30 a.m.-5:00 p.m. EST.

48. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kimberly D. Nguyen can be reached on (571) 272-2402. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

49. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/M. B./
Examiner, Art Unit 4174

/Jacob Y Choi/
Examiner, Art Unit 2885